



Australian Government

Cotton Research and
Development Corporation

FINAL REPORT 2015

Executive Summary

Part 1 - Summary Details

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CRDC Project Number: CSE1403

Project Title: Automated Insect Monitoring (AIM) for
Cotton Pest Management: Feasibility
Study

Project Commencement Date: 01/07/2013 **Project Completion Date:** 30/06/2015

CRDC Research Program: 2 Industry

Final Report Executive Summary

Automated monitoring and surveillance of arthropods in crops is the way of the future. Automation allows for cost effective, real-time, spatially explicit information about pests and beneficial insects, changes in work flow of agronomists and bug-checkers, and in turn more effective and efficient decisions about pest management. To achieve this two main factors must align: an effective means to monitor the target species, and cost effective software / hardware that is used for real-time, spatially explicit information that is sent to an end-user.

The main outcomes of our work is that: 1) automation should first focus on *Helicoverpa* – a lure-based trap shows the most promise; 2) our re-designed *Helicoverpa* trap resulted in 4 times more catches, and this new design should be considered for automation; 3) for exotic insect threats automated monitoring should seek species-specific traps and lures (which may be acquired from overseas), then retro-fit with AIM device, which can be deployed in high-risk areas such as ports or stations at key locations throughout the cotton growing regions; 4) automating interception traps has provided information about the behaviour of pests and beneficials. These devices have improved our knowledge of the time of day that insects are active and the relationship between the detection of insect activity out of- and in the cotton crop. Traps outside the field are more informative, they pick up more individuals earlier and in higher numbers; spiders are active from dawn – 2pm, then later

in the day; lady beetles and brown lacewings are active all day long; green lacewings are active late morning – 2pm, lepidoptera are active dawn and dusk; and 5) the concept of using a single trap, e.g., interception SLAM trap for assessing multiple species simultaneously is a ways in the future. The SLAM trap is not suitable for assessing mirids, pirate bugs and juveniles of any species, and the current AIM is not set up to assess organisms less than 2mm in size, e.g., thrips, and whiteflies. Currently, the SLAM AIM trap cannot replace beat sheet samples, which still seem to be the best method to sample dozens of species of adult and juvenile pests and beneficials.

Following on from key results, the way forward includes: 1) refining and automating the traps for *Helicoverpa* – our lab-traps caught 4 times more than the industry standard. Adding automation to this new design could significantly increase the probability of detection, change the workflow of bugcheckers and agronomists, and provide an early warning for a population outbreak due to a surge in resistance; 2) explore the options of ground creeping robots, similar to the ones moving through the field to do plant assessments, to include an insect monitoring platform; and 3) simulate scenarios of population densities and trap placement to increase our understanding about probability of detection and the number, and placement of traps for effective deployment.

In conclusion, the main challenges of automation of insect monitoring is combining the insect behaviour with engineering solutions (hardware and software) that result in low power demand, low cost and equivalent to other methods. The CSIRO AIM team continues to develop solutions that meet these criteria. Through testing, trialling, and refining we hope to arrive at automated insect monitoring that allows for changes in workflow of bug checking, and rapid response to pest outbreaks.